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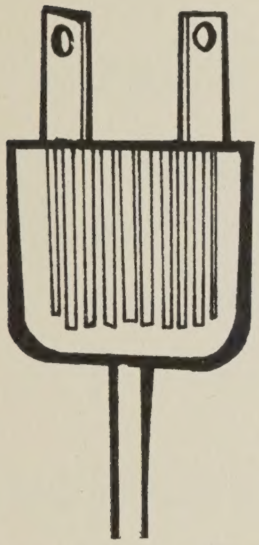

ELECTRICAL INFORMATION for FARM WATER and SEWAGE INSTALLATIONS

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ELECTRICAL INFORMATION FOR FARM WATER & SEWAGE INSTALLATIONS

PURPOSE: This bulletin gives electrical information for farm water and sewage installations. Basic electricity and wiring principles are available elsewhere. This bulletin is not a substitute for the Canadian Electrical Code and emphasis is placed on compliance with any and all requirements of the local authorities relative to any electrical installation.

ELECTRICAL WIRING PERMIT: If you plan to do any electrical wiring, you should complete an application for owner's permit and send it with the required fee to:

The Department of Labour
Electrical Inspection Branch
I.B.M. Building
10808 - 99 Avenue
Edmonton, Alberta

If you are hiring an electrician to do your electrical wiring, your electrician will secure the permit.

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1. SELF-PRIMING SEWAGE PUMPS

(a) Self-priming sewage pumps are electrically operated and controlled. Electrodes are suspended in the septic tank pumpout chamber. When the liquid level in the pump-out chamber touches the high electrode, the pump starts. When the liquid is pumped below the low electrode, the pump stops.

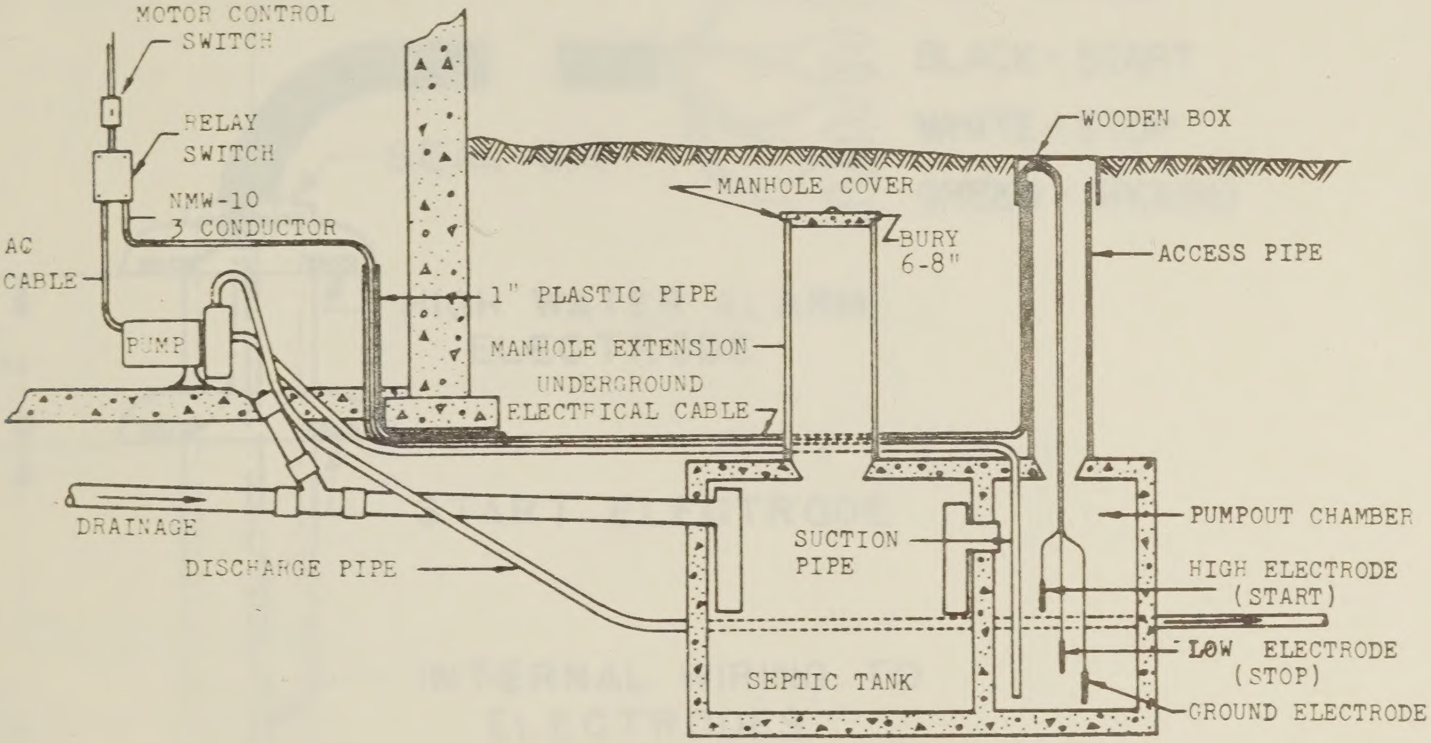


Figure 1 - Self-priming sewage pump installation

Install the low electrode 6 inches above the suction pipe intake or the pump may loose prime. For easy adjustment or cleaning, the cable supporting the electrodes should be accessible at the top of the access pipe.

(b) Electrode Connection - Care is necessary when connecting the electrodes to the underground wire. A water-tight seal must be maintained between the two. Install the electrodes so they do not touch other electrode wires or the septic tank wall.

If the high and low electrode wires are wrongly connected to each others' terminals in the control box, the pump will start and stop repeatedly at one second intervals, as the effluent splashes against the high electrode. Exchanging the electrode wires at the control box will correct this. Similar symptoms are evident when the low electrode does not make an electrical connection with its wire.

If the control box hums for several seconds instead of starting or stopping the pump with a snap, the electrodes are dirty, one or more connections are loose, or the points are burned.

Clean electrodes each fall before freeze up. In the cleaning procedure the electrodes should not be taken apart. It may be desirable to remove the bottom one inch of bakelite or plastic electrode sheath to expose the brass probe for cleaning purposes. In most cleaning operations scraping the brass probe and washing in warm water and detergent is all that is required. When electrodes are badly encrusted, they can be soaked in a water-muriatic acid solution to loosen the encrustation.

(c) Electrode Assembly - The electrode assembly is a single plastic probe type with internal wiring to brass electrode rings. It is a package unit with easy to clean electrodes and features a high water alarm which can be added to the unit if desired. The assembly comes complete with a standard 35-foot length of cable.

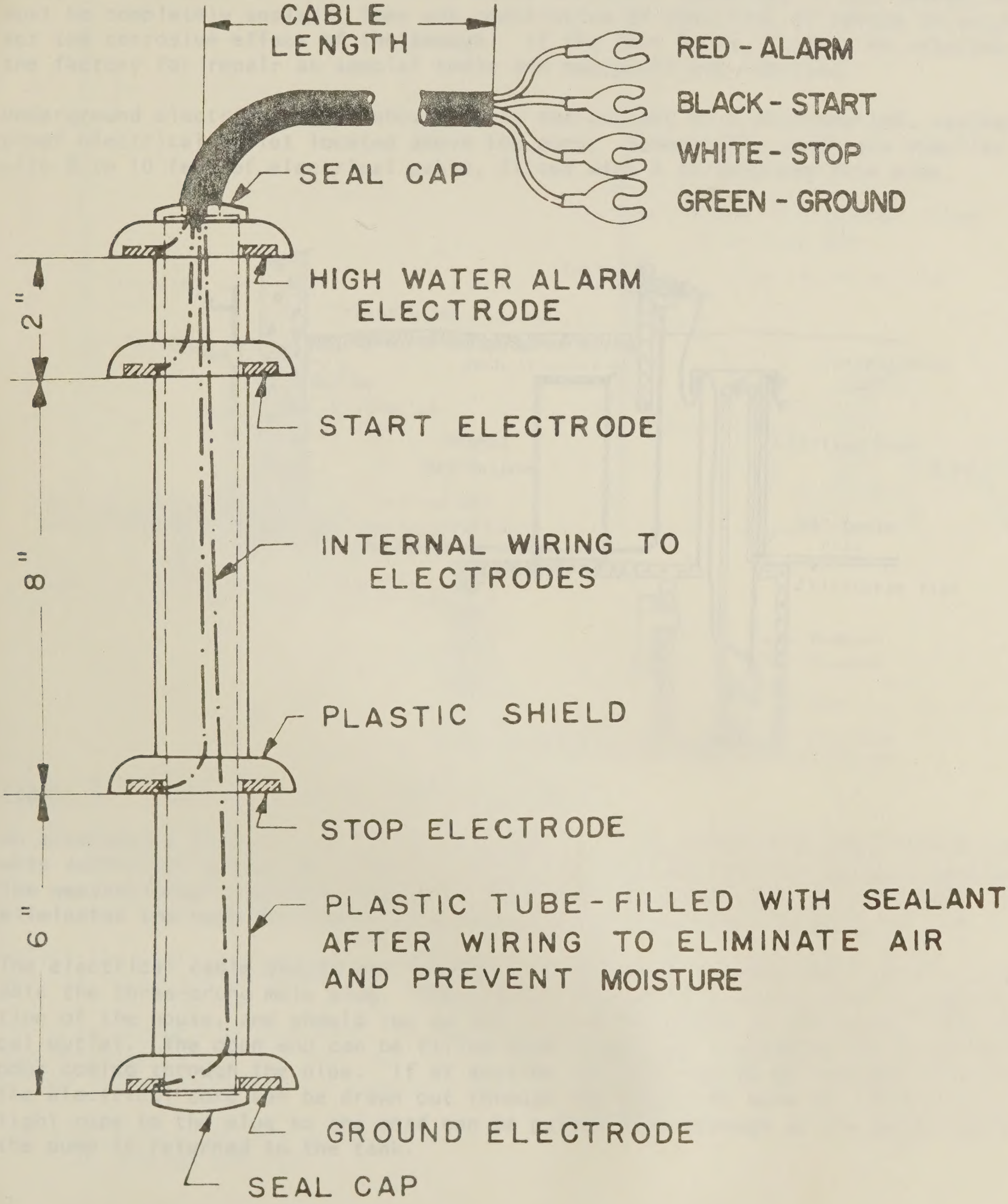


Figure 2 - Electrode assembly

2. SUBMERSIBLE SEWAGE PUMPS

Submersible sewage pumps are designed to be installed in the septic tank pumpout chamber. They operate be means of either a pressure differential diaphragm switch or by a float control switch. Since these units are submersed in the sewage, they must be completely sealed. They are constructed of cast iron or bronze to counteract the corrosive effect of the sewage. If the unit fails, it must be returned to the factory for repair as special tools and equipment are required.

Underground electrical cable should carry the current to a post-mounted, weatherproof electrical outlet located above the pump. Submersible pumps are supplied with 8 to 10 feet of electrical cable, fitted with a three-prong male plug.

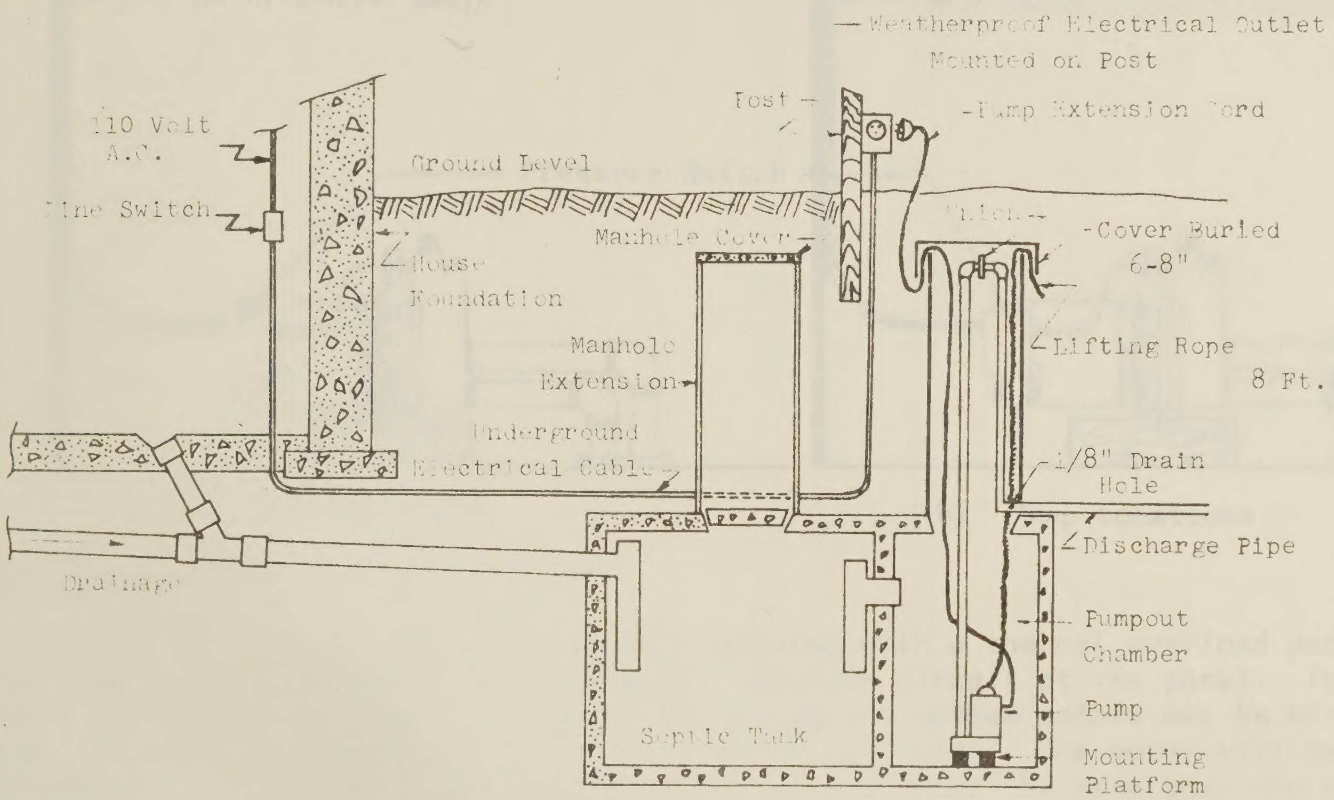
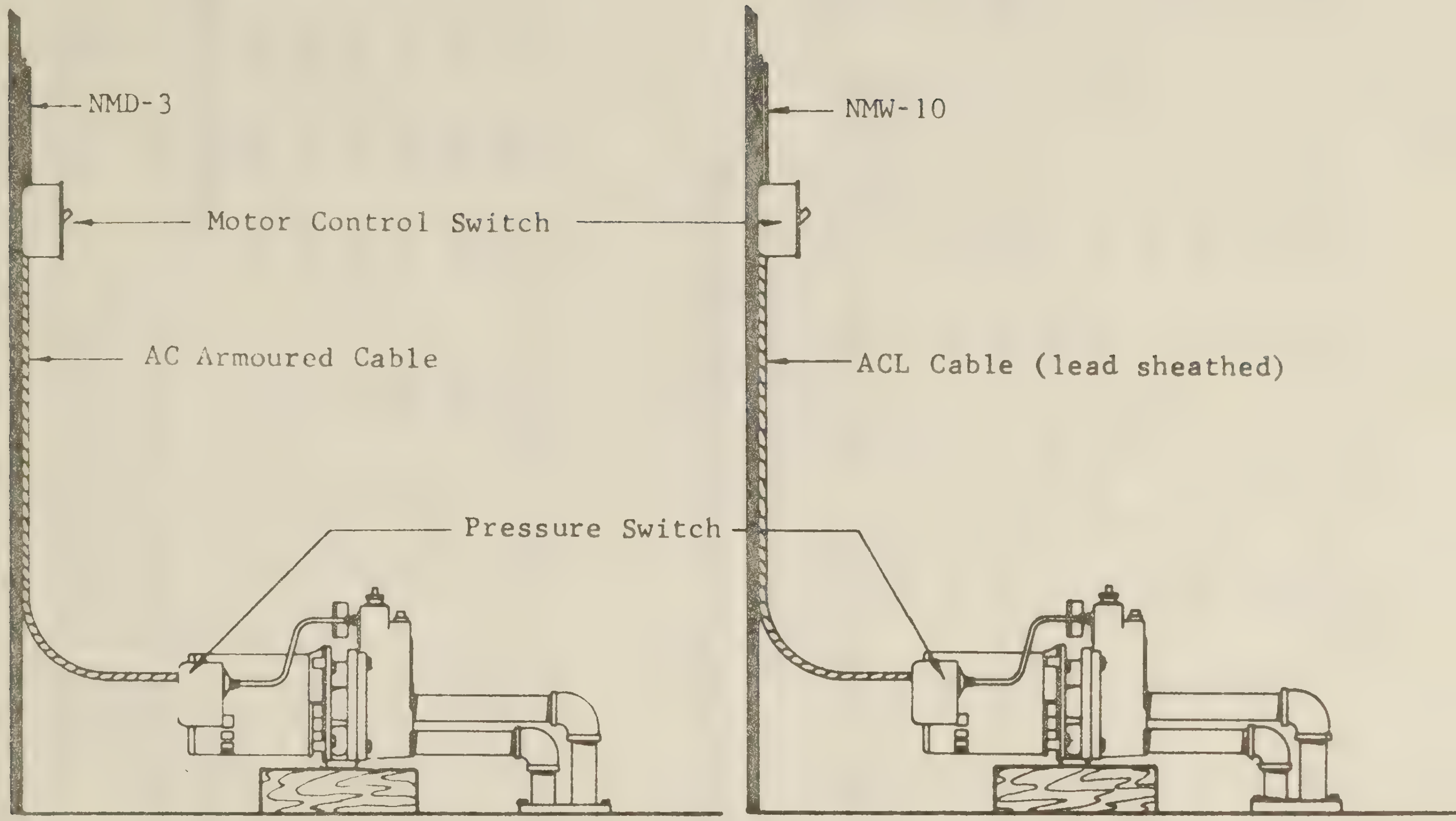


Figure 3 - Submersible sewage pump installation

An alternative electrical hook up can be made if the submersible pump is ordered with sufficient electrical cable to reach the house; 20 feet is usually adequate. The weather-proof electrical outlet is then mounted on the wall of the house, which eliminates the need for a post to be placed in an area which is normally lawn.

The electrical cable should run through a plastic pipe of sufficient size to accomodate the three-prong male plug. The plastic pipe is laid underground to the foundation of the house, and should run up the wall of the house to the base of the electrical outlet. The open end can be filled with fiberglass insulation to reduce any odor coming through the pipe. If at anytime the pump has to be removed from the tank, the electrical cord can be drawn out through the pipe. Be sure to tie a wire or light rope to the plug so the cord can be pulled back through to the power outlet when the pump is returned to the tank.

3. PRESSURE PUMPS



(a) Dry Locations

(b) Damp Locations

Figure 4 - Pressure pump installation

The motor on a pressure system should be protected with a thermal overload and automatic reset. Wire the pressure system to a separate circuit at the panel. Install a motor control switch near the motor. Many pressure system motors may be wired for 120 or 240 volts. Such motors perform better on 240 volts. The motor will have the information on it as to how to wire it for either voltage. Be sure that the motor is wired for the voltage supplied.

It is very important to ground the system through the service entrance panel.

4. SELECTION OF CONDUCTOR SIZE

Select the correct conductor size to maintain necessary voltage at the point of use, when the full electrical load is applied.

It is important not to exceed the recommended length of wire to an electric motor as the motor may stall and burn out due to low voltage. A motor which can be wired for either 120 or 240 volts will perform more satisfactorily on 240 volts than 120 volts.

The size of a conductor depends upon:
- (a) Voltage applied
- (b) Current flow (amps) which varies directly as the load (watts)
- (c) Length of run
- (d) Voltage drop allowed (2% only)

COPPER CONDUCTOR SIZE FOR 2 PER CENT VOLTAGE DROP - 2 CONDUCTORS

	120 Volts								240 Volts							
Motor	Full Load Amps	Circuit Breaker (Amps)	Overload Protection (Amps)	Wire Size (AWG)					Full Load Amps	Circuit Breaker (Amps)	Overload Protection (Amps)	Wire Size (AWG)				
				12	10	8	6	4				12	10	8	6	4
				Maximum Distance (Feet)								Maximum Distance (Feet)				
¼ H.P.	4.8	15	6.25	140	215	360	550	870	2.4	15	3.75	600	865	1380	2190	3475
1/3	6.0	15	7.50	110	180	280	500	700	3.0	15	3.75	480	720	1100	1750	2800
1/2	7.0	15	8.75	100	160	240	400	600	3.5	15	5.0	400	600	1000	1500	2400
3/4	9.4	20	11.25	70	110	190	300	475	4.7	15	6.25	280	440	750	1120	1775
1	-	-	-	-	-	-	-	-	5.5	15	7.50	260	380	640	950	1520
1½	-	-	-	-	-	-	-	-	7.6	20	10.	180	285	450	780	1100

TABLE II Selection of Conductor Sizes to Motors

COPPER CONDUCTOR SIZE (AWG) FOR 2 PER CENT VOLTAGE DROP ON 120 VOLTS

Current Amps	Wattage	Approximate Distance in Feet (for 240 volts, multiply distance by 2)																				
		20	30	40	50	60	70	80	90	100	120	140	160	180	200	240	280	320	360	400	450	500
1.0	120	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	12
1.5	180	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	12	12	12	12	10
2	240	14	14	14	14	14	14	14	14	14	14	14	14	14	14	12	12	12	12	10	10	10
3	360	14	14	14	14	14	14	14	14	14	14	14	12	12	12	12	10	10	10	8	8	8
4	480	14	14	14	14	14	14	14	14	14	12	12	12	10	10	10	10	8	8	8	8	6
5	600	14	14	14	14	14	14	14	14	12	12	12	10	10	10	8	8	8	8	6	6	6
6	720	14	14	14	14	14	14	12	12	12	10	10	10	10	8	8	8	6	6	6	6	6
7	840	14	14	14	14	14	12	12	12	12	10	10	10	8	8	8	6	6	6	6	5	5
8	960	14	14	14	14	12	12	12	12	10	10	10	8	8	8	6	6	6	6	5	5	4

TABLE I Selection of Conductor Sizes for all Uses

5. SUBMERSIBLE WATER PUMPS

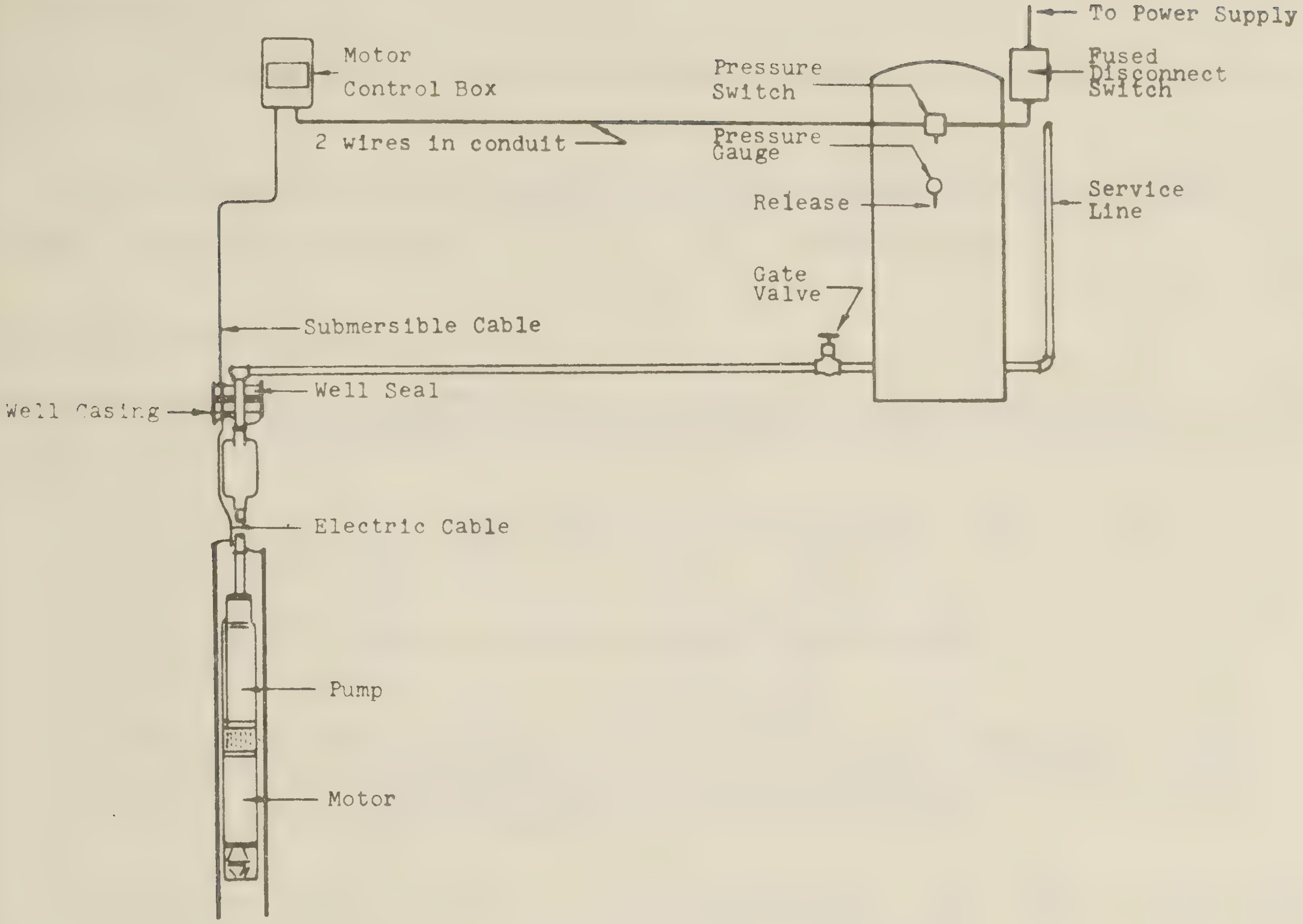


Figure 5 - Wiring for submersible pump

Submersible pump controls may be grounded to either the entrance panel, the metal well casing, or a ground rod near the pump.

The wiring diagrams for the control boxes vary between manufacturers, models, and sizes, therefore, refer to the manufacturer's instructions during installation.

The capacitor for the motor is contained in the control box. Therefore, always wire the control box into the circuit when testing the pump.

6. HEATING TAPE

Used for frost protection of electrically heated water bowls, exposed water lines and water pumps.

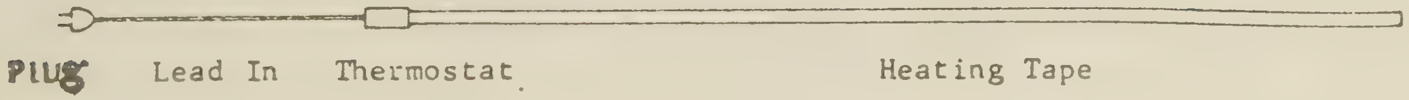


Figure 6 - Heating tape

Approved heating tapes or cables must be installed in accordance with the manufacturer's instructions and specifically in compliance with the following from the electrical code:

1. An approved power supply outlet must be provided within 12 inches of the installation.
2. When used on metallic piping systems, the piping must be effectively grounded.
3. Wherever possible, installation in air temperature below 32°F is to be avoided, but in any event such installations must not be made unless suitable precautions are taken to maintain the flexibility of the tape or cable and prevent the insulation from cracking.
4. Wrapping is to be carried out spirally with not less than one inch spacing between wraps and in such a manner as to avoid contact between any points of the tape or cable. If cross-overs are unavoidable, the layers of tape or cable shall be separated by 1/8 inch asbestos sheets or equivalent.
5. The wrappings must be securely held in place by material which will not damage the tape or cable and the installation must be completed in a manner which will provide adequate protection from mechanical damage.
6. The original length of a heating tape or cable must not be altered under any circumstances.

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